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The explanation of these facts was referred by the writer to the sun's divellent force.† The disturbing influence of *Jupiter*, however, may alone have been sufficient. The mean density of the solar nebula when its radius was 300,000,000 miles was  $\frac{1}{340,000,000}$  the present mean density of the sun being unity. The surface attraction of a primitive or nebulous asteriod was therefore almost *nil*. No exact calculations seem necessary to show that the separated masses might have been dismembered by the unequal attraction of *Jupiter* on the different parts. In other words, this influence was sufficient not only to detach the matter of asteroids from the central body, but also to subdivide the newly-formed nebulous planets until the fragments finally resulted in the existing asteroids. Evidence is not wanting of the actual occurrence of such division in the case of comets.‡ The study is not unworthy the careful attention of astronomers.

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#### ASTRONOMICAL OBSERVATIONS.

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Made by TORVALD KÖHL at Odder, Denmark, in the year 1890.

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Although the following notes do not claim any importance in regard to the progress of Astronomy, I yet venture to publish these few contributions to our astronomical knowledge in the hope that they, perhaps, will be of some interest to the members of the A. S. P.

*January 21, 10<sup>h</sup> A. M. (Time of Copenhagen):* A group of sun-spots consisting of three larger and some smaller spots is situated near the western limb of the sun's disc.

*February 9, 7-9<sup>h</sup> P. M.:* The *Zodiacal light* appears pretty plain.

Northern limb:  $347^{\circ} + 3^{\circ}$ ,  $357^{\circ} + 6^{\circ}$ ,  $7^{\circ} + 9^{\circ}$ ,  $14^{\circ} + 12^{\circ}$ ,  
 $21^{\circ} + 14^{\circ}$ ,  $28^{\circ} + 17^{\circ}$ .

Southern limb:  $7^{\circ} + 19^{\circ}$ ,  $11^{\circ} + 9^{\circ}$ ,  $13^{\circ} + 0^{\circ}$ ,  $20^{\circ} + 6^{\circ}$ ,  
 $32^{\circ} + 13^{\circ}$ .

At 8<sup>h</sup> the star  $\beta$  *Ceti* was seen in the southern limb. The summit of the *Zodiacal light* seems to reach the middle of *Aries*.

Corresponding observations had been projected between Dorset, England, and Odder, Denmark, but the cloudy weather did not favor the undertaking. Nevertheless the Rev. S. J. JOHNSON, M. A.,

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\* The *Asteroids*, p. 48.

† See the *Annuaire* for 1891, p. 301. Compare also the elements of the comets of 1668, 1843, 1880, and 1882.

F. R. A. S., in Dorset, succeeded in making good observations on the 7th, 8th, 9th, 10th, 11th and 17th of February, but on the 9th he has only the following remarks:

"Well seen to-night. I could not perceive any red tint such as has often been mentioned. But it was inferior to the Milky Way, inasmuch as it had none of the *milky* whiteness of the latter."

*February 23, March 2 and 3:* The sun without any spots. On the last day a little facula (German: "Fackel") was seen near the eastern limb.

*March 9, 4½<sup>h</sup> P. M.:* A little group of three sun-spots is situated in the northwestern part of the sun's disc.

*March 15, April 1, 3, 4, 5, 6, 7, 8, 9, 14, 20, 27:* The sun had no spots on its surface.

*April 29, 5<sup>h</sup> P. M.:* A group of more than fifteen sun-spots is situated in a south heliographic latitude.

*April 30, 8<sup>h</sup> A. M. and 3 P. M.:* The group is now a little more contracted on two places.

At 8<sup>h</sup> 30<sup>m</sup> P. M.: One hour past sunset the planet *Mercury* is plainly seen with the *naked eye* about three degrees northwards from *Venus* near the horizon in the northwestern sky. Then the planets were observed by aid of the telescope and drawings were made (3-inch telescope, power 168).

*May 2, 3, 4:* No sun-spots visible.

*May 13, 3<sup>h</sup> P. M.:* In the south part of the sun's surface two spots were perceived.

*May 15, 16:* No sun-spots.

*May 18, 8<sup>h</sup> A. M.:* A group consisting of three sun-spots is situated on the southern hemisphere.

*May 19, 8<sup>h</sup> A. M.:* The sun-spot has grown less.

*May 20, 4<sup>h</sup> P. M.:* The sun-spot near the sun's limb is exceedingly faint.

*May 22, 23, 31, June 1:* No sun-spots.

*June 8, 8<sup>h</sup> A. M.:* A little sun-spot is situated near the southwestern limb.

*June 9, 9<sup>h</sup> A. M.:* In the place where the spot should be situated, only an exceedingly small black point is now visible, but surrounded with very bright faculae.

*June 10, 12, 14, 15, 16:* No sun-spots visible.

*June 17:* The partial *solar eclipse*. In spite of the cloudy weather, I succeeded in getting a series of drawings of this beautiful

phenomenon, which took place here from 9<sup>h</sup> 30<sup>m</sup> to 11<sup>h</sup> 37<sup>m</sup> A. M. When the eclipse had reached its maximum, 0.36 of the sun's diameter was covered by the moon. In order to make the eclipse visible to several spectators, the image of the sun was enlarged to the size of one foot in diameter and projected upon a plate of white paper behind the telescope, and thus a number of visitors (about seventy) could witness the interesting sight.

*July 5, 8<sup>h</sup> A. M.:* A group of small sun-spots is seen at the eastern limb.

*July 7, 8<sup>h</sup> A. M.:* A group of three larger and several little spots westwards are visible.

*July 9, 8<sup>h</sup> A. M.:* The group has still not changed very much in general characteristics, but a new circular spot has appeared westwards near the group, and this very dark spot consists apparently only of the umbra and seems to be quite without any penumbra and is so distinct and limited that it has great likeness to a planet (as *Mercury*) on the sun's disc.

*July 10, 7½<sup>h</sup> A. M.:* While the first group has decreased, the mentioned circular spot has grown larger and has been provided with a narrow penumbra, and in the neighborhood five faint black points are visible, but already at 11½<sup>h</sup> A. M. these points have contracted and formed a greater spot.

*July 11, 8<sup>h</sup> A. M.:* The group has not changed very much since the foregoings day.

*July 12, 7<sup>h</sup> A. M.:* The former chief group is now disappearing, but near the circular spot two smaller spots are visible.

*July 13, 7<sup>h</sup> A. M.:* No great change has taken place in the group of sun-spots.

*July 16, 8<sup>h</sup> A. M.:* No spots. A large facula is situated near the western limb.

*July 17, 2<sup>h</sup> P. M.:* The sun without spots and faculæ.

*August 8, 9:* No spots. Facula at the northwestern limb.

*Publications of the**Observations on Shooting Stars.*

No.	Time. h. m. s. P.M.	Beginning.	End	Magn	Notes.
1	August 9, 10 0 45	° °	° °	2	
2	" 15 30	360+63	315+81	1	
3	" 21 0	16+33	26+33	3	
4	" 38 0	347+20	339+13	2	
5	" 41 0	335+11	339+ 7	3,	slow
6	" 45 40	330+15	333+ 7	4	
7	" 49 10	293+16	283+ 8	1	train
8	" 56 15	20+22	52+29	2	blue, train
9	" 11 8 0	46+40	46+33	2	
10	" 16 45	39+38	35+34	2	
11	" 23 0	353+15	346+ 7	1	train
12	" 27 30	344+22	330+ 7	1	train
13	" 42 45	6+13	2+ 4	3	train
14	" 51 30	7+49	345+33	3	train
15	" 57 50	10+11	4+ 1	2	
16	" 10, 10 42 30	7+49	346+42	3	train
17	" 49 0	2+18	353+ 9	2	train
18	" 57 20	318+28	308+20	3	train
19	" 11 19 40	347+14	341+ 9	3	
20	" 26 30	312 ÷ 3	303 ÷ 15	2	sparkling train
21	" 32 40	55+40	55+34	1	train
22	" 51 10	8+40	358+29	1	train
23	" 54 45	324 ÷ 1	318 ÷ 10	2	
24	" 56 50	13+ 9	4 ÷ 2	2	train
25	" 59 10	8+29	19+30	2	train
26	" 12, 10 1 30	310+50	228+66	2	rather slow

The light of the very beautiful blue meteor No. 8 gradually diminished until it reached the middle of its path; then all at once the light was again brighter, but, within a few moments, the meteor was suddenly extinguished. On the 11th and 12th of August cloudy weather troubled the observations.

*August 10, 12, 14, 15, 16, 17, 18, 22, 24:* No sun-spots.

*August 14, 11<sup>h</sup> P.M.:* A review of the region near *61 Cygni* was undertaken in regard to the small star No. 15 in the sketch by

SUN-SPOTS IN 1890 DRAWN WITH A 3-INCH TELESCOPE, BY TORVALD KÖHL

LITH. B & S. F.

1890, Sept. 25.



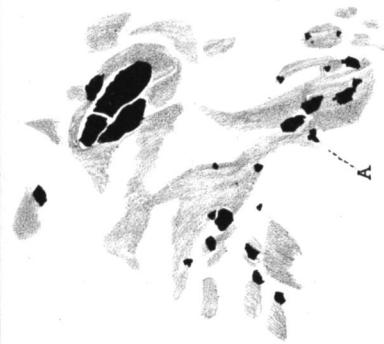
1890, Sept. 27.



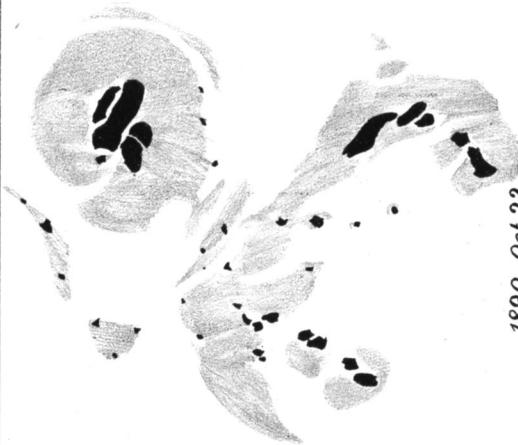
1890, Sept. 28.



1890, Oct. 21.



1890, Oct. 22.



Professor RUDOLPH FALB (vide "Sirius," August, 1870), which star I had missed one year ago. Professor FALB states the star had been carefully observed in the summer of 1870 and then it was "at the limit of visibility" for his 3-inch telescope with a power of fifty. Thus the star must have been of the 11th magnitude. But, at present, this little star is missing both in my own sketch containing thirty stars and in a photographic sketch with not less than seventy stars. On October 2d and November 16th this very region was investigated by the distinguished observer, Mr. BARNARD, by the aid of the 12-inch refractor of the Lick Observatory, who succeeded on the last date in identifying the small star, which now is of only the 13½ magnitude. There is thus no doubt that the star has decreased from the 11th to the 13½ magnitude, for in consideration of the great northern declination, it is not probable that the star was an asteroid.

*September 21, 8<sup>h</sup> 2<sup>m</sup> P. M.: Algol in minimum.*

*September 24, 4<sup>h</sup> P. M.: A group of sun-spots is situated near the eastern limb.*

*September 25, 2½<sup>h</sup> P. M.: The group has grown larger and consists of a great double spot A and a group B situated more westwards.*

*September 27, 8½<sup>h</sup> A. M.: A has decreased very much; B, however, has grown larger.*

*September 28, 4¾<sup>h</sup> P. M.: The southern part of A has fully disappeared; the group B consists of eight great spots.*

*October 2, 3<sup>h</sup> P. M.: The group still present not far from the northwest limb of the sun, but it has decreased very much.*

At 10<sup>h</sup> 43<sup>m</sup> P. M. the moon would occult *Neptune* and the planet should remain covered until 11<sup>h</sup> 45<sup>m</sup> P. M., but the observation was interfered with by *Cirri*, which produced a magnificent bright ring around the moon.

*October 4, 8<sup>h</sup> A. M.: No sun-spots visible, but near the northwestern limb a facula of enormous dimensions is situated. Its length was about 21' 15" in angular measure and its real length in the north-south direction therefore about 50,000 miles.*

*October 6, 4<sup>h</sup> P. M.: A new spot has appeared in the southwestern part of the sun's surface.*

*October 8, 10, 12, 13, 16, 17, 18: No sun-spots.*

*October 20, 9<sup>h</sup> A. M.: A group of sun-spots with great faculae is situated near the southeastern limb and must have entered the disc yesterday.*

*October 21, 10 $\frac{1}{2}$ <sup>h</sup> A. M.:* The group presented a wonderful appearance—an enormous deep black spot, with immense mass of penumbra round it. The sketch shows the appearance of the group at 12 $\frac{1}{2}$ <sup>h</sup> P. M. Several small spots have meantime formed in the western part of the group; I specially noticed that two hours earlier the little spot *a* only formed a projection from the penumbra.

*October 22, 2 $\frac{1}{2}$ <sup>h</sup> P. M.:* On this date the group appeared to be most complicated. The western part of it was shaped like a horse-shoe. This immense group presented a spectacle of great solar activity. A little lonely double spot is seen at a distance of half a radius from the large group towards the north.

*October 23, 3 $\frac{1}{2}$ <sup>h</sup> P. M.:* None of the groups has changed very much since yesterday. The horse-shoe-like figure is still present. Eastward of the small group a new little spot has appeared.

*October 26, 9 $\frac{1}{2}$ <sup>h</sup> A. M.:* Great contraction in the large group, so that it is now reduced almost to a single spot; but an enormous spot, consisting of two rows of black umbræ, separated by a tongue of light, stretches through the large spot from north to south. The small group has disappeared; but, instead of it, a new group of small spots has formed northwestward of the large group.

*October 27, 10<sup>h</sup> A. M.:* No great change in the sun-spots since yesterday. There seems to be a tendency to tranquillity in the neighborhood of the groups.

*October 28, 9<sup>h</sup> A. M.:* The last remarks on the groups may be repeated to-day.

*October 30, 8 $\frac{1}{2}$ <sup>h</sup> A. M.:* The sun-spots are now rather near the western limb.

*November 13, 10<sup>h</sup> A. M.:* A little spot is seen in the northwestern part of the sun's disc.

*November 16, 17:* No sun-spots visible.

*November 22, 10<sup>h</sup> A. M.:* A group of sun-spots is situated quite near the eastern limb.

*November 23, 1<sup>h</sup> P. M.:* The group consists of two separated parts, the eastern with three and the western with two umbræ. Between these spots some masses of penumbra are dispersed.

The low latitude of the sun and unfavorable weather rendered it difficult to obtain good solar observations in December.

*December 7, 6<sup>h</sup> P. M.:* *The region near the star 26 Cygni* is reviewed. On the nights of 1887, March 23 and 27 (vide circular L. A. S., No. 16), a red star 7 $\frac{1}{2}$  magnitude was observed 5° following

3' south of 26 *Cygni*. There is no star in DM at this place. The new star shows a spectrum III Type. It is Z *Cygni* = Chandler 7192. The place of 26 *Cygni* for 1887 is

A R = XIX<sup>h</sup> 58<sup>m</sup> 9<sup>s</sup>  
Decl. = + 49° 46'.9

On the 22d April, 1887, I made a sketch of this region and then perceived that the mentioned star Z was equal in brightness to the star b. With respect to the intensity these stars must be thus ranged: 26, (b=Z), a, c.

On the 7th December, 1890, it was found that the star Z had decreased, for now the range is: 26, b, (a=Z), c.

At the end of the year the star Z was difficult to see. On 1891, January 1, 8<sup>h</sup> p. m., I succeeded in observing the following sequence: 26, b, a, c, Z.

Besides the above mentioned observations, a great many reviews of sketches of the fixed stars have been made with reference to supposed variations.

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ADDRESS OF THE RETIRING PRESIDENT OF THE SOCIETY, AT THE THIRD ANNUAL MEETING, MARCH 28, 1891.

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By EDWARD S. HOLDEN.

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The Society has now been in existence for a little more than two years, and it is, perhaps, not too soon for us to look back over these short years, and to inquire how far we have fulfilled the mission in which we engaged, and especially to inquire what we must look forward to in the future.

Let us first bring together the obvious statistics of our history. On the 7th of February, 1889, a few of us who had been brought into close relations by the observations of the Solar Eclipse of the first of January, determined to form a little club, or society, which should perpetuate those relations, and which should make them fruitful. We began with a membership of 40, nearly all residents of San Francisco or of Santa Clara County. At the annual meeting, a year ago, our membership was 192. After exactly two years' existence